8(5).   SOV/161-58-3-4/27

AUTHOR: Gorban', A. P., Candidate of Technical Sciences, Instructor
             (Moscow)

TITLE: On the Use of the Effect of Mutual Induction for the Trans-
             formation of a Single-phase Current Into a Three-phase One
             and Vice Versa (Ob ispol'zovanii yavleniya vzaimnoy induktsii
             dlya preobrazovaniya odnofaznogo toka v trekhfaznyy i obratno)

ABSTRACT: In the introduction it is pointed out that this idea is not
             new, but that it has hitherto only rarely been dealt with in
             scientific literature. The author worked out a wiring circuit
             which transforms both three-phase- into single-phase current
             and also single-phase- into three-phase current. The basic
             wiring system is given (Fig 1); it consists of a transformer
             and a three-phase motor. A sectional view of the transformer
             with its windings is shown (Fig 2). If the device is connect-
             ed to a single-phase mains, the transformer produces the neces-
             sary phase shifting for the three phases of the three-phase
             current motor, or the three-phase current of the generator
             is transformed by the transformer into a single-phase current.

Card 1/3

SOV/161-58-3-4/27

On the Use of the Effect of Mutual Induction for the Transformation of a Single-phase Current Into a Three-phase One and Vice Versa

By vector analysis the voltages, the resistance of the motor, and the amperages in the phases are then investigated (Fig 3). The parameters of the transformer warranting a phase shift of 120° are derived, and the coefficients of inductive coupling are determined. The condition for the stability of the phase position is investigated and a vector diagram of voltages and currents is given (Fig 4). Finally, an oscillogram of the phases of a three-phase current motor is given (Fig 5) for the case in which the device is fed from a single-phase mains. Experimental results are given by a table. There are 5 figures, 1 table, and 6 references, 5 of which are Soviet.

This article was recommended for publication by the Kafedra elektrotekhniki Moskovskogo lesotekhnicheskogo instituta (Chair for Electrical Engineering at the Moscow Institute for Forestry Engineering)

ASSOCIATION: Kafedra elektrotekhniki Moskovskogo lesotekhnicheskogo instituta (Chair for Electrical Engineering at the Moscow Institute for Forestry Engineering)

Card 2/3

SOV/161-58-3-4/27

. On the Use of the Effect of Mutual Induction for the Transformation of a Single-phase Current Into a Three-phase One and Vice Versa

SUBMITTED: May 16, 1958

Card 3/3

GORBAN', A.P.; TKHORIK, Yu.A.

Device for measuring the capacitance of semiconductor diodes.
Avtom. i prib. no.2:57-60 Ap-Je '63.   (MIRA 18:8)

1. Institut poluprovodnikov AN UkrSSR.

Lyashenko, V. I.; Gorban', A. P.; Yevtushenko, L. ...

TITLE: Investigation of the effect of adhesion of photocarriers on the surface of silicon

SOURCE: Fizika tverdogo tela, v. 7, no. 2, 1965, 565-572

adhesion, photoconductivity, photoconductivity relaxation, surface electron transition, recombination, photocarrier adhesion

The purpose of the investigation was to establish the electronic and ... surface states for which the minority carriers can adhere to the ... determine the detailed mechanism ... electric exchanges ... local level and the band which leads to violation of the bipolar nature ... investigated ... determine the carrier adhesion ... Aden band on the ...

Card 1/3

L 38615-65

ACCESSION NR: AP5005302

large amplitude rectangular electric-field pulses. The measurements were made in vacuum ($\sim 10^{-6}$ torr) on thin samples ($\sim$ 300u) of p-type silicon ($\sim 10^3$ ohm-cm, $\tau_{inr} \sim 10^2$ usec), cut along the (111) plane and etched. A detailed description of the procedure and the equipment, and of data on the band model of the real surface of the silicon, is contained in a separate article (UFZh v. 10, no. 2, 1965). The results show that the form of the photoconductivity relaxation may be connected with character of the space-charge surface layer. A model is proposed for the electronic transitions, according to whi) the accumulation of carriers in the band is due to the "delayed recombination" levl. According to this model, illumination transfers the "delayed recombination" levels into pure combination levels, and therefore the long-time relaxation is eliminated by illumination. When the temperature is increased, to the contrary, the number of levels going over to the "de-combination" levels increases, in agreement with experiment. It is show

ASSOCIATION: Institut poluprovodnikov AN UkrSSR, Kiev (Institute of Semiconductors

Card 2/3

LITOVCHENKO, V.G. [Lytovchenko, V.H.]; GORBAN', A.P. [Horban', A.P.];
    KOVBASYUK, V.P.

    Use of the method of small pulse perturbations in studying a
    real silicon surface. Ukr. fiz. zhur. 10 no.3:287-297 Mr '65.
                                                    (MIRA 18:6)

    1. Institut poluprovodnikov AN UkrSSR, Kiyev.

L 18405-63   BDS

ACCESSION NR: AP3003734   S/0103/63/024/007/0871/0881

47

AUTHOR: Gorban', A. V. (Moscow)

TITLE: Synthesizing controlled systems; alternate solutions of one class of degenerated variational problems. 1

SOURCE: Avtomatika i telemekhanika, v. 24, no. 7, 1963, 871-881

TOPIC TAGS: controllable system, degenerated variational problem

ABSTRACT: In this first part of the article, the variational problem of synthe-sizing a closed-type controlled system is formulated, and three auxiliary theorems are proved. The simplest class of controlled systems — determinate and completely observable — is dealt with. The problem is mathematically characterized as a nonclassical, degenerated (or in K. Karateodori's term "irregular") where a conditional minimum in a nonparametric form is sought. Considering the kinematic nature of unknown quantities, the conventional

Card 1/2

L 18405-63

ACCESSION NR: AP3003734   0

analytical method is modified, and a new synthesizing approach is suggested,
viz.: in the formulas for the necessary conditions of minimum, in the equivalent
variational problem, a part of the auxiliary variables (Lagrange multipliers) is
eliminated by using the algebraic set of Euler's equations that are included in the
first necessary conditions of minimum; this procedure results in (a) a fundamental
Bellman's functional equation and (b) two functional inequalities; the original
problem is thus reduced to solving the (a) and (b) simultaneously. Orig. art.
has: 26 formulas.

ASSOCIATION: none

SUBMITTED: 04Oct62   DATE ACQ: 02Aug63   ENCL: 00

SUB CODE: IE   NO REF SOV: 003   OTHER: 011

Card 2/2

GORBAN', A.V. (Moskva)

Synthesis of regulated systems and alternativeness of solutions
for a class of degenerated variational problems. Avtom. i
telem. 24 no.8:1042-1049 Ag '63.   (MIRA 16:8)

(Automatic control)

GORBAN', A.V. (Moskva)

Problem of synthesis of controlled systems. Avtom. i telem.
24 no.10:1297-1302 O '63.   (MIRA 16:11)

GORBAN B. G.

		109-5-8/22
AUTHOR:	GORBAN',B.G., TEREXHINA,L.P.	
TITLE:	Evaluation of Generator Frequency Stability. (K voprosu ob otsenke stabil'nosti chastoty generatora, Russian)	
PERIODICAL:	Radiotekhnika i Elektronika, 1957, Vol 2, Nr 5, pp 591-596 (U.S.S.R.)	

ABSTRACT: A short analysis of the criteria for generator properties is here
carried out. Relations establishing connection between frequency-
and phase evaluations of generator stability are derived. It is
shown how it is possible to compute spectral density, the correla-
tion function, and the dispersion of the phases during the chosen
period of observation according to the correlation function of the
frequency deviations from the mean value or according to the spec-
tral density of frequency deviations. An example is given for com-
puting the dispersion of the "phase accumulation" according to a
given spectral density of frequency deviations. (With 2 Illustra-
tions and 4 Slavic References).

ASSOCIATION: Not given
PRESENTED BY:
SUBMITTED: 30.7.1956
AVAILABLE: Library of Congress

Card 1/1

GORBAN', B.G.

Dispersion of phase bunching in klystron oscillators stabi-
lized by the automatic frequency-control method. Nauch.dokl.
vys.shkoly; radiotekh. i elektron.no.1:200-208 ' 58.
(MIRA 12:1)

1. Kafedra radiopriyemnykh ustroystv Moskovskogo energeticheskogo
instituta.
(Klystrons)

_____ regulator for milk of lime entering the defecator.
D. V. Gorban. *Sakharnaya Prom.* 29, No. 6, 30(1951).—
The installation of an intermediate tank with a cone bottom
between the milk of lime-measuring tank and the defecator,
with 18% larger capacity than the measuring tank, permits
a uniform feed of milk of lime. The discharge valve must
have a conical shape and should be adjustable by means of a
screw which is regulated from above the tank. A general
drawing is shown.
                                                    V. E. Balhow

GORBAN', D.V., YEFIMOV, F.A.

Sugar – Manufacture and Refining

Industrial capacity of filter presses. Sakh. prom. 26 no. 3, 1952

Monthly List of Russian Accessions, Library of Congress, June 1952. UNCLASSIFIED.

GORBAN', D.V.

Our method of juice purification. Sakh.prom.30 no.1:44-45 Ja '56.

(MIRA 9:6)

1.Sakharnyy zavod imeni Stalina.
(Sugar industry)

GORBAN', D.V.

Calculating the capacity of crystallizers and centrifugals for second massecuite. Sakh.prom. 30 no.8:24-27 Ag. '56. (MLRA 9:11)

1. Sakharnyy zavod imeni Stalina.
(Centrifuges) (Sugar industry--Equipment and supplies)

GORBAN', D.V.

Checking the alkalinity of the juice of second carbonation. Sakh.
prom.30 no.9;58 S '56.   (MIRA 10:3)

1. Sakharnyy zavod imeni Stalina.
                (Sugar industry)

GORBAN' B.I.

Intensification of industrial processes. Sakh.prom. 30 no.10:43-47 0 '56.   (MIRA 10:1)

1. Sakharnyy zavod imeni Stalina)
                (Sugar industry)

GORBAN', D.V.

Intensify the work of plant laboratories. Sakh.prom. 31 no.3:10-
11 Mr '57.   (MIRA 10:4)

1.Sakharnyy zavod imeni Stalina.
          (Sugar industry)

GORBAN', D.V.; TVERDOKHLEBOV, L.S.

Increasing the Yield of bleached sugar. Sakh.prom. 31 no.7:20-23
Jl '57.   (MLRA 10:8)

1.Sakharnyy zavod imeni Stalina.
                    (Sugar industry)

GORBAN', D.V.

Several causes of lowering of the quality of brown sugars.
Sakh.prom. 33 no.7:22-24 Jl '59.   (MIRA 12:11)

1. Sakharnyy zavod imeni Stalina.
              (Sugar manufacture)

GORBAN', D.V.

Lowering the sugar content of molasses. Sakh.prom. 36 no.5:19-23
My '62.   (MIRA 15:5)

1. Lokhvitskaya gruppovaya laboratoriya.
                    (Sugar manufacture)

GORBAN', D. V.

Flocculation characteristics of the affination runoff sirup of unrefined cane sugar. Sakh. prom. 36 no.10:20-21 O '62.
(MIRA 15:10)

1. Lokhvitskaya gruppovaya laboratoriya.

(Sugar manufacture)

GORBAN', D.V.

Importance of selecting the optimum system for juice purification
and of the method of crystallisation. Sakh.prom. 37 no.2:11(91)-
14(94) F '63.   (MIRA 16:5)

1. Lokhvitskaya gruppovaya laboratoriya.
                        (Sugar manufacture)

GORBAN', D.V.

Some observations concerning the "Notes of the technology and economics of sugar manufacture." Sakh. prom. 37 no.3:42-44 Mr '63.   (MIRA 16:4)

1. Lokhvitskaya gruppovaya laboratoriya.
                                    (Sugar manufacture)

GORBAN', D.V.

Nonuniformity of the temperature and concentration of massecuite
in a vacuum apparatus. Sakh. prom. 37 no.5:14-17 My '63.
                                                (MIRA 16:6)

1. Lokhvitskaya gruppovaya laboratoriya.
                        (Sugar manufacture)

ACCESSION NR: AT4037691   S/2865/64/003/000/0210/0216

AUTHOR: Gorban', G. M.; Kondrat'yeva, I.I.; Poddubnaya, L. T.

TITLE: Gaseous products of vital activity liberated by man in sealed chambers

SOURCE: AN SSSR. Otdeleniye biologicheskikh nauk. Problemy° kosmicheskoy biologii, v. 3, 1964, 210-216

TOPIC TAGS: respiration, air purification, metabolic waste

ABSTRACT: Experimental studies have shown that a human being in the process of his vital activities liberates a number of toxic gaseous products into the surrounding medium. Thus, for example, a chamber in which a man has been sealed for 24 hours will contain 297 mg of ammonium, 278 mg of carbon monoxide (417 mg for smokers), 504 mg of hydrocarbons, 0.6 mg of aldehydes, 235 mg of ketones, 5 mg of mercaptans and hydrogen sulfides, and 89 mg of fatty acids. Permanent contaminants in the air of the sealed chamber were carbon dioxide, hydrocarbons, aldehydes, and ammonium. The carbon dioxide and hydrocarbons were found only in a gaseous form; the others both in the air and in the condensate. Data accumulated

Card 1/2

ACCESSION NR: AT4037691

in these experiments indicate the necessity of developing effective means of
purifying air and of working out standards for permissible limits for the con-
centration of toxic substances in sealed chambers.

ASSOCIATION: none

SUBMITTED: 00

ENCL: 00

SUB CODE: PH, LS

NO REF SOV: 014

OTHER: 005

Card 2/2

L 11374-67   EWT(1)   SCTB   DD/GD

ACC NR: AT6036499   SOURCE CODE: UR/0000/66/000/000/0066/0068

AUTHOR: Bizin, Yu. P.; Gorban', G. M.; Zinov'yev, V. M.; Pilipyuk, Z. I.;   _33_
Sidorov, K. K.; Solomin, G. I.; Shirskaya, V. A.; Yablochkin, V. D.

ORG: none

TITLE: Changes in several physiological indices of the organism in a gas medium
formed by polymer decomposition [Paper presented at the Conference on Problems of
Space Medicine held in Moscow from 24 to 27 May 1966]

SOURCE: Konferentsiya po problemam kosmicheskoy meditsiny, 1966. Problemy
kosmicheskoy meditsiny. (Problems of space medicine); materialy konferentsii,
Moscow, 1966, 66-68

TOPIC TAGS: toxicology, polymer degradation, central nervous system, liver, closed
ecological system, air pollution

ABSTRACT: The combined effect on animal organisms of the chemical substances
formed by the degradation of some 14 polymers at temperatures in excess
of $40°C$ was studied in a 25-day experiment.

Analysis of air from the chamber containing 80 laboratory animals showed
the following: acrylonitrile, 2.8 ± 1.7 mg/m^3; aldehydes, 0.02 ± 0.01
mg/m^3; ammonia, 4.6 ± 1.3 mg/m^3; acetone 1.07 ± 0.6 mg/m^3; dibutylphtha-
late, 3.7 ± 0.4 mg/m^3; sulphur dioxide, 1.77 ± 0.8 mg/m^3; carbon monoxide,

Card 1/3

L 11374-67

ACC NR: AT6036499

19.1 ± 1.3 mg/m^3; hydrocarbons, 600 ± 218 mg/m^3; hydrogen chloride, 2.46 ± 1.2 mg/m^3; epichlorhydrine, 0.33 ± 0.08 mg/m^3; ethyl acetate, 1.61 ± 0.6 mg/m^3; and ethylene glycol, 0.7 ± 0.4 mg/m^3.

Carbon dioxide content varied up to a maximum of 1%, oxygen content was 21%, and the relative humidity varied from 60 to 80%.
Blood studies conducted on the animals included erythrocyte count, leukocyte count, reticulocyte count, and hemoglobin determinations, as well as duration of bleeding, rate of coagulation, prothrombin time, thrombocyte count, and blood viscosity. Ability to synthesize hippuric from benzoic acid was taken as an index of the functional state of the liver.

In addition, observations were made of behavior and general conditions of the animals, dynamics of weight changes, tolerance to physical stress, and oxygen requirement. Relative weights of internal organs were determined.

The experimental animals were observed preceding, during, and for 14 days after the experiment.

Prolonged continuous exposure of the animals to the chemical substances liberated by the polymers produced nonspecific functional shifts.

Card 2/3

L 11374-67
ACC NR: AT6036499

CNS effects included subcortical irritation and weakening of cortical sub-ordination function. This resulted in intersection of extensor and flexor motor chronaxy curves, lowered susceptibility to brain stem hexanol narcosis, and increased tolerance to physical stress.

Peripheral blood studies showed increased erythrocyte, hemoglobin, and thrombocyte counts.

These CNS and peripheral blood shifts were unstable and nonspecific, and should be regarded as an adaptation reaction of the organism to the presence of gases released by polymer materials. This interpretation is supported by full restoration of the altered functions and indices to the initial state within 14 days after the end of the experiment.

It is concluded that the investigated polymers can be used in space cabins so long as the gases they liberate are scrubbed from the cabin air before they attain the maximum permissible concentration for small closed compartments. [W.A. No. 22; ATD Report 66-116]

SUB CODE: 06 / SUBM DATE: 00May66

Card 3/3

Gorban', I. S.

USSR/Physics

Card 1/1   Pub. 43 - 17/62

Authors   : Gorban', I. S., and Shishlovskiy, A. A.

Title   : Anomalous light dispersion in solutions of complex organic compounds

Periodical : Izv. AN SSSR. Ser. fiz. 18/6, 676-677, Nov-Dec 1954

Abstract : The light dispersion in solutions of fluorescein, iodo-eosin, fuchsin,
cyanine, rhodamine B, etc., was investigated by means of a combined spectro-
meter/Rayleigh interferometer. These organic compounds were chosen because
of their known simple absorption bands in the visible zone of the spectrum.
It was found, in contrast to vapors with lined absorption spectrum, that
the dispersion curves of the investigated complex organic compound solutions
have an asymmetry within the simple absorption bands and that the maximum
of the absorption curve is much better expressed than the minimum. One
USSR Reference (1953). Graph.

Institution : The T. G. Shevchenko State University, Physics Faculty, Kiev

Submitted : .....

GORBAN', I. S.

GORBAN', I. S. -- "Investigation of the Anomalous Dispersion of Light in Solutions." Kiev State U imeni T. G. Shevchenko. Kiev, 1955. (Dissertation for the Degree of Candidate of Physicomathematical Sciences.)

SO: Knizhnaya letopis', No. 4, Moscow, 1956

FD-3209

USSR/Physics - Spectral Analysis of Liquids

Card 1/1   Pub. 153-18/28

Authors   : Gorban' I. S. and Shishlovskiy A. A.

Title   : Two simple spectro-interference methods for studying dispersion in the visible and ultraviolet spectral bands

Periodical : Zhur. Tekh. Fiz., 25, No 7, 1297-1306, 1955

Abstract   : The first method uses Fresnel diffraction on the boundary of two transparent media. The other possibility consists in measuring of dispersion curves of liquids and solutions without previous knowledge of their refractive index. An assembled Rayleigh type interference meter was used. It is also possible to study this way the anomalous dispersion of light in solutions. Five references.

Institution: --

Submitted : July 4, 1954

GORMAN, I. S.

GORBAN', L. S., KISHLOVSKIY, A.A.

Rayleigh-type mirror interferometer. Opt. i spektr. 1 no.6:
811-812 O '56.   (MLRA 9:12)

1. Kiyevskiy Gosudarstvennyy universitet.
                    (Interferometer)

GORBAN', I.S.; RIZHOVA, S.M.; SHISHLOVS'KIY, O.A.

Spectral and interference method for the quantitative analysis of two- and three-component solutions. Nauk.zap.Kiev.un. 15 no.5:61-66 '56.   (MIRA 10:7)

(Chemistry, Analytic--Quantitative) (Solutions)

GORBAN, I. S

Anomalous dispersion of light:
...rban and A...

GORBAN, I.S.

PRIKHOT'KO, A.F.

24(7)   p.3   PHASE I BOOK EXPLOITATION   SOV/1365

L'vov. Universytet

Materialy X Vsesoyuznogo soveshchaniya po spektroskopii. t. 1:
Molekulyarnaya spektroskopiya (Papers of the 10th All-Union
Conference on Spectroscopy. Vol. 1: Molecular Spectroscopy)
[L'vov] Izd-vo L'vovskogo univ-ta, 1957. 499 p. 4,000 copies
printed. (Series: Its: Fizychnyy zbirnyk, vyp. 3/8/)

Additional Sponsoring Agency: Akademiya nauk SSSR. Komissiya po
spektroskopii. Ed.: Uazer, S.L.; Tech. Ed.: Saranyuk, T.V.;
Editorial Board: Landsberg, G.S., Academician (Resp. Ed., Deceased),
Neporent, B.S., Doctor of Physical and Mathematical Sciences,
Fabelinskiy, I.L., Doctor of Physical and Mathematical Sciences,
Fabrikant, V.A., Doctor of Physical and Mathematical Sciences,
Kornitskiy, V.G., Candidate of Technical Sciences, Rayskiy, S.M.,
Candidate of Physical and Mathematical Sciences, Klimovskiy, L.K.,
Candidate of Physical and Mathematical Sciences, Miliyanchuk, V.S.,
Candidate of Physical and Mathematical Sciences, and Glauberman,
A. Ye., Candidate of Physical and Mathematical Sciences.

Card 1/30

Card 19/30

GORBAN', I.S.; SHISHLOVSKIY, A.A.

Abnormal dispersion of light in dilute solutions. Fiz. sbor. no.3:
286-289 '57.   (MIRA 11:8)

1. Kiyevskiy gosudarstvennyy universitet im. T.G. Shevchenko.
          (Solution (Chemistry))   (Dispersion)

AUTHOR: Gorban', I. S.   48-22-5-17/22

TITLE: Optical Properties of Carbonate of Alkaline Earths
(Opticheskiye svoystva sloyev karbonatov
shchelochnozemel'nykh metallov)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya,
1958, Vol. 22, Nr 5, pp. 607-612 (USSR)

ABSTRACT: Thin layers of various substances customary in
vacuum-technique are, from the optical point of view,
forming opaque media consisting of single parts. The
paper under consideration is devoted to the study of
the influence of structure conditions on the optical
properties of carbonate pastes. The author comes to the
following conclusions: 1. He proved that the character
of the standard light deviation depends essentially
on the thickness and density of the coating when light
passes through a carbonate layer. 2. He suggested an
optical method with a simultaneous measuring of
thickness and density of the film of oxide already
used in the production of oxide cathodes. This method

Card 1/2

Optical Properties of Carbonate of Alkaline Earths   48-22-5-17/22

may be efficient under working conditions in case it is restricted to the measuring of two intensities $I_0 0$ and $I_{10} 0$; this can be done easily if the thickness of the layer and its density satisfy some standard conditions. 3. The results achieved reflect apparently the very general regularities, which are typical for opaque media. Professor N. D. Morgulis and lecturer N. G. Nakhodkin, further A. F. Sribnaya cooperated as advisors and helped at the measuring. There are 8 figures and 5 references, 4 of which are Soviet.

ASSOCIATION: Kiyevskiy gos. universitet im. T. G. Shevchenko (State University imeni T. G. Shevchenko, Kiyev)

1. Alkaline earth carbonates—Optical properties

Card 2/2

GORBAN', I.S. [Horban', I.S.]

Characteristics of the absorption spectrum in the region of the yellow series of Cu_2O. Visnyk Kyiv.un.no.2.Ser.fiz.ta khim. no.1: 45-48 '59.

(MIRA 14:8)

(Copper oxide—Spectra)

GORBAN', I.S. [Horban', I.S.]

Optical absorption and structure of energy states of copper oxide.
Ukr. fiz. zhur. 5 no.2:281-285 Mr-Ap '60.   (MIRA 13:12)

1. Kiyevskiy ordena Lenina gosudarstvennyy universitet im.
T.H. Shevchenko.
                    (Copper oxide--Optical properties)

24.3950

AUTHORS: Gorban, I. S., Timofeyev, V. B.

TITLE: Light Absorption by Cuprous Oxide Films

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 6, pp. 1111-1114

TEXT: The authors used films produced at V. I. Lyashenko's Laboratory of
IFAN UkrSSR by sputtering Cu onto a quartz backing and subsequent oxidation
of this layer. The absorption spectra were taken by means of an ИСП -51
(ISP-51) spectrograph with a self-collimating chamber of the type УФ -85
(UF-85). The signals were received by a photomultiplier and recorded by a
ПСР (PSR) electron potentiometer. The absorption curves were drawn at the
temperature of liquid oxygen. Results are shown in Fig. 1. The two curves
which correspond to two specimens, have peaks at 4700 A. The drop of the
curve to the long-wave region differs according to the oxygen content of
the specimen. The solid specimens exhibited the same general spectrum, but
the absorption coefficient of the film specimens was much higher than that
of the solid specimens, especially in the long-wave region. This phenomen-
on is ascribed to lattice defects of the former. By a proper elimination

Card 1/2

Light Absorption by Cuprous Oxide Films

81624
S/181/60/002/06/12/050
B122/B063

of the background it was possible to observe a series of yellow lines. The curve was shifted to longer waves when the experimental temperature was elevated. This shift slightly deviated from linearity. This deviation is described as being the mean coefficient of temperature shift (Table). Again, the deviation was greater in the case of films, and is ascribed to their content of stoichiometric oxygen. Unlike the solid specimens, the films were not luminescent. A surface treatment of the solid specimens influenced the fine structure of the spectral distribution of the function of lumines- cent excitation and the internal photoeffect, as is known from earlier publications. Finally, the authors thank V. I. Lyashenko for supplying the specimens and for his valuable advice. There are 2 figures, 1 table, and 7 references: 6 Soviet and 1 German.

ASSOCIATION: Kiyevskiy gosudarstvennyy universitet im. T. G. Shevchenko
(Kiyev State University im. T. G. Shevchenko)

SUBMITTED: March 20, 1959

Card 2/2

26.2420

AUTHORS: Gorban', I. S. and Timofeyev, V. B.

TITLE: Polarization in the Absorption Spectrum of the Cubic Cuprous
              Oxide

PERIODICAL: Fizika tverdogo tela, 1960, Vol. 2, No. 9, pp. 2077-2078

TEXT: Reference is made to a paper of Ye. F. Gross and A.A. Kaplyanskiy
(Ref. 1) according to which the absorption line of the longest wavelength
(the first of the yellow hydrogen-like series) of cubic cuprous oxide is
polarized. The following gives a summary of the observations in the
present paper in connection with the above-mentioned topic: 1) The
polarization of this line is confirmed. 2) A quantitative measurement of
the absorption at this line in polarized light was made by means of an
interferometer and ИСП-51 (ISP-51) spectrograph. The results are shown
in Fig. 1. The curve 1 represents the absorption when the vibrations of
the electric vector are parallel to the (110) plane. The other curves
correspond to the absorption with rotation of the polarizer by 10^0. No
structural changes appear. There is no dichroic splitting. When the plane

Card 1/2

Polarization in the Absorption Spectrum of   S/181/60/002/009/040/047/XX
the Cubic Cuprous Oxide   B004/B070

of vibration of the light vector is rotated, the intensity changes accord-
ing to a cosine law corresponding to a plane polarization. This amounted
to about 90%. 3) The polarization was observed in microcrystalline
samples of Cu_2O also; this indicates a tendency of orientation of the

monocrystalline blocks. The polarization was absent only in samples of
very fine crystals. There are 1 figure and 2 Soviet references.

ASSOCIATION: Kiyevskiy ordena Lenina gosudarstvennyy universitet im.
              T. G. Shevchenko (Kiyev "Order of Lenin" State University
              imeni T. G. Shevchenko)

SUBMITTED: February 22, 1960

Card 2/2

26.2421

AUTHOR: Gorban', I.S.

TITLE: Optical absorption and structure of energy states
            of copper oxide

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 5, no 2, 1960,
            281-284

TEXT: The results are given of a quantitative study of absorption
spectra of Cu_2O crystals in the visible range. First, absorption
curves are shown for specimens with different specific resistance,
at room temperature. In the range 6730 - 6100 Å, the absorption
depends on the dark conductivity of the specimen; in this range the
absorption is inversely proportional to specific resistance. It is
noted that the absorption in this range is due to impurity centers
of the acceptor type, whose concentration is uniquely determined by
residual oxygen. Further, results are given for a temperature of
-180°C. The absorption due to acceptor-type centers, becomes weak-
er. The intensity of the peaks of the yellow series does not de-

Card 1/3

25584
S/185/60/005/002/021/022
D274/D304

Optical absorption...

pend on the impurity concentration. The independence - of the inten-
sity of the structural spectrum - of impurity concentration, at low
temperatures and at the longwave edge of the principal band, shows
that these band series are due to self-absorption of the crystal.
The fact that two hydrogen-like series (yellow and green) are ob-
served, is explained by a splitting of the valence zone due to the
spin-orbit coupling of the 3d electrons of copper. S.O. Moskalenko
(Ref. 10 FTT, being printed) has shown that the 3d-shell of Cu^+ in
Cu_2O has to be assumed as split into no less than three subzones.
The frequency dependence of the coefficient of continuous absorption
is given (for the yellow series). It follows from the results given
that the structure of the long-wave absorption edge is due to three
types of direct "forbidden" transitions. The continuum of the red
series lies in the region of the yellow-series absorption bands. The
results obtained do not permit ascertaining the nature of the upper
component of the valence subzone and of the red series corresponding
to it. Three possible reasons for its formation are given. In con-
clusion, Cu_2O ought to contain no less than 4 types of carriers. On
comparing the intensity of the three series, it is noted that the

Card 2/3

Optical absorption...

25584

S/185/60/005/002/021/022
D274/D304

valence subzones which are responsible for the yellow- and green series, have a great density of energy states; this corresponds to the considerable effective masses of carriers; this property is important as lying at the basis of the spectral distribution of photo-conductivity. There are 2 figures and 14 references; 9 Soviet-bloc and 5 non-Soviet-bloc. The references to the English-language pub-lications read as follows: J. Bloem, Philips Res. Repts., 13, 167, 1958; R.J. Elliot, Phys. Rev., 108, 6, 1384, 1957.

ASSOCIATION: Kyyvs'kyy ordena Lenina derzhavnyy universytet im. T.G. Shevchenka (Kiyev Order of Lenin State Univer-sity im. T.G. Shevchenko)

SUBMITTED: November 28, 1959

Card 3/3

6.3300

26660

S/185/60/005/003/016/020
D274/D303

AUTHORS: Gorban', I.S., Rud'ko, S.M. and Shyshlovs'kyy, O.A.

TITLE: Wavelength-independence of quantum yield of infra-
red Cu_2O-luminescence during excitation in the region
of exciton absorption spectra

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 5, no. 3, 1960,
420-422

TEXT: The dependence is studied of the intensity of infrared lum-
inescence of Cu_2O on the wavelength during excitation in the region
of the yellow and green hydrogenic series.   In literature, there is
no common viewpoint regarding the mechanism of excitation-energy
transmission to the local impurity-centers which cause the lumines-
cence.   A quantitative study of the Cu_2O absorption-spectrum at
liquid-air temperature, showed that the long-wave edge of the eigen-
absorption band has a complex structure.   In the present study, a
lamp of 300 watt was used as a light source.   Then the light passed

Card 1/3

26600

Wavelength independence of quantum...

through a monochromator and onto a photomultiplier whose signal
was amplified and recorded by electronic potentiometer PSP-1. The
measurements were conducted at liquid-air temperature. A figure
shows the intensity plotted vs. wavelength (in $\mathring{A}$). The spectrum
was obtained from a specimen 50 μ thick. From the figure it is
evident that stronger luminescence corresponds to greater absorp-
tion. It was established that the dependence of luminescence on
wavelength does not have a structure corresponding to the narrow
hydrogenic series of exciton absorption. The investigation shows
that the intensity of luminescence does not depend on the nature of
the exciting light. The processes involved in the luminescence can
be explained by assuming an exciton mechanism of energy transmiss-
ion to the luminescence centers. Excitation by carriers is likely
owing to the size of the exciton radius. The lifetime of the car-
riers in the conduction zone is very short; this may be the reason
for the small quantum-yield of photoconductivity in Cu_2O which
agrees with the results of earlier investigations. In conclusion,
the author considers that a complete solution of the problem would

Card 2/3

26606

S/185/60/005/003/016/020
D274/D303

Wavelength independence of quantum...

require further experimental results. There is 1 figure and 6 references: 5 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: J. Bloem, Philips Research Reports, 13, no. 2, 167-193, 1958.

ASSOCIATION: Kyyivs'kyy derzhavnyy universytet im. T.G. Shev-
                chenka (Kiyev State University im. T.G. Shevchenko)

SUBMITTED: December 31, 1959

Card 3/3

GORBAN', I.S.; TIMOFEYEV, V.B.

Properties of the longest wavelength line in the structural
absorption of Cu_2O. Opt.i spektr. 9 no.4:482-486 O '60.
(MIRA 13:11)

(Copper oxide--Spectra)

AUTHORS: Gorban', I. S., Timofeyev, V. B.

TITLE: Light absorption by cuprous oxide films

TEXT: The absorption spectra of films and bulky crystals of cuprous oxide were confronted at room and low (-180°C) temperatures. The broad-band structure of the Cu_2O absorption spectrum was established. Owing to the greatly disordered state of the crystal lattice, the narrow-band exciton structure is absent in absorption spectra of cuprous oxide films.

[Abstracter's note: Complete translation]

Card 1/1

38050 R
S/051/60/009/006/009/013
E032/E314

26.2421

AUTHOR: Gorban', I.S.

TITLE: A Quantitative Study of the Absorption Spectrum of
            Cuprous Oxide

PERIODICAL: Optika i spektroskopiya, 1960, Vol. 9, No. 6,
             pp. 759 - 764

TEXT: The results now reported were first presented at a
session of the Commission for Semiconductors of the AS
Ukrainian SSR, which was held in August, 1959, in Odessa.
In order to obtain a definitive explanation of the hydrogenic
series in the spectrum of cuprous oxide, the present author
has carried out quantitative measurements which have provided
information about the dependence of the absorption line
intensities on impurity concentrations. He has also investigated
regularities in the distribution of intensities among the
absorption bands of a given series and between different series.
About thirty series of mono- and polycrystalline specimens of
cuprous oxide with differing dark electrical conductivities
were used. It turned out that the dark conductivity of the
specimens and the structure of their absorption spectrum were

Card 1/4

A Quantitative Study ....

S/051/60/009/006/009/018
E032/E314

very dependent on the method of preparation of the specimens.
The measurements were carried out with the aid of the ИСП-51
(ISP-51) spectrograph with an autocollimating camera УФ-85
(UF-85). The intensities were measured with a special photo-
electric attachment. A special exit slit was mounted in the
plane in which the plate-holder is usually located and was
followed by a photomultiplier. The signal from the photo-
multiplier was amplified and then recorded by pen-recorder.
An example of a recorded spectrum showing the absorption band
of Cu_2O is shown in Fig. 1. As can be seen, there are four

absorption bands belonging to the yellow series which is
observed in the spectrum of a cuprous-oxide plate 15 μ thick
and cooled down to -180 °C in a special cryostat. Fig. 2
shows three absorption curves in the region of the long
wavelength absorption edge at room temperatures. Curves 1, 2
and 3 correspond to specimens with the following values of
dark resistivity: 1.26×10^3, 1.11×10^4 and 1.02×10^6,
respectively (the units are ohm.cm). Fig. 3 shows the

Card 2/8 4

absorption curves at -180 °C in the region of the yellow and
green series for specimens with differing conductivities.
Curves 1, 2, 3 and 4 correspond to the following values of
dark resistivity: 1.26×10^3, 1.11×10^4, 1.05×10^5 and
1.02×10^6, respectively (ohm.cm). Fig. 3A shows the overall
form of the absorption edge for two specimens, while
Figs. 3B and 3C show the absorption curve on a larger scale
in the region of the yellow and green series, respectively.
Fig. 4 shows the absorption curve corresponding to the first
member of the yellow series (n = 1). This curve was obtained
with the aid of a Fabry-Perrot interferometer for a specimen
with $\rho = 1.95 \times 10^6$ ohm.cm. The table gives the most important
characteristics of the yellow hydrogenic series at -180 °C.
In this table n is the principal quantum number, λ_{max} is the
position of the maximum on the wavelength scale, k_{max} is the
absorption coefficient at the maximum, Δ is the halfwidth
of the band, S_n/S_2 is the ratio of the area under the n-th

Card 3/8

A Quantitative Study ....

S/051/60/009/006/0c9/018
E032/E314

band to the area under the band with $n = 2$, k_n/k_2 is the corresponding ratio of absorption coefficients at the maximum. It is argued on the basis of the results now reported that the hydrogen-like series of bands which are observed at the fundamental absorption edge are due to absorption by the lattice and not by the impurities. The structure of the fundamental edge in the spectrum of cuprous oxide can be explained on the assumption that the absorption is associated with transitions between states of the same parity. Acknowledgments to A.A. Shishlovskiy, K.B. Tobygo and S.A. Moskalenko for their advice. There are 4 figures, 1 table and 15 references: 9 Soviet and 4 non-Soviet. The English-language reference quoted is: Ref. 10 - R.J. Elliott, Phys. Rev., 108, 1384, 1957.

SUBMITTED: November 26, 1959

Card 4/4

SHISHLOVSKIY, Aleksandr Andreyevich. Prinimali uchastiye: KONDILENKO,
I.I., dotsent; GORBAN', I.S., dotsent. VERES, L.F., red.;
RAUTIAN, S.G., red.; MURASHOVA, N.Ya., tekhn.red.

[Applied physical optics] Prikladnaia fizicheskaia optika.
Moskva, Gos.izd-vo fiziko-matem.lit-ry, 1961. 822 p.

(MIRA 14:3)

(Optics, Physical)

GORBAN', I.S.; GRITSENKO, Yu.I.; RUD'KO, S.N.

Photoluminescence and recombination of current carriers in cuprous oxide crystals. Fiz.tver.tela 3 no.7:2147-2153 Jl '61.
(MIRA 14:8)

1. Kiyevskiy gosudarstvennyy universitet imeni T.G.Shevchenko.
(Cuprous oxide crystals)   (Photoelectricity)

32070
S/181/61/003/012/004/028
B102/B108

24.3500 (1137, 1138)

AUTHORS: Gorban', I. S., and Timofeyev, V. B.

TITLE: Exciton-phonon absorption spectrum in Cu_2O crystals

PERIODICAL: Fizika tverdogo tela, v. 3, no. 12, 1961, 3584 - 3588

TEXT: The absorption spectrum of Cu_2O shows two steps, one below the
line n-1. On the nature of the latter there exist only hypotheses. The
authors studied the temperature dependence of light absorption in order
to solve the problem of the steps and the continuous absorption below the yel-
low and green series. Transmission measurements were carried out with a
spectrometer with plane diffraction grating. The spectral width of its
slit was 0.45 $\overset{o}{A}$ at temperatures ranging from that of liquid air to +20°C.
The absorption coefficients were calculated for each frequency from the
intensity ratio of the transmitted to the incident light, without con-
sidering reflection. Special measurements showed that the reflection
coefficient near the steps was independent of frequency and did not

Card 1/4

32070

Exciton-phonon absorption ...

affect the results. Temperature and frequency dependence of the absorption coefficient at the first and second steps are given by

(1)

$$\Delta k_1 = a_1 \frac{1}{e^{\frac{h\nu_\phi}{kT}} - 1} (\nu - \nu_0 + \nu_\phi)^{1/2},$$

(2)

$$\Delta k_2 = a_1 \frac{1}{e^{\frac{h\nu_\phi}{kT}} - 1} (\nu - \nu_0 + \nu_\phi)^{1/2} + a_2 \frac{e^{\frac{h\nu_\phi}{kT}}}{e^{\frac{h\nu_\phi}{kT}} - 1} (\nu - \nu_0 - \nu_\phi)^{1/2},$$

ν_0 denotes the frequency of the line n=1; $\Delta k = k_\nu - k_\nu^0$. Frequency and temperature dependence of light absorption at the steps agrees with the theory of J. Elliott (Phys. Rev. 108, 6, 1957) if the steps are assumed to be caused by exciton-phonon excitation of the crystal. The long-wave step belongs to excitation of the exciton state n = 1 with phonon absorption, the short-wave step to light-quantum absorption exciting the same exciton states with phonon production. The frequency dependence

Card 2/4

Exciton-phonon absorption ...

32070
S/181/61/003/012/004/028
B102/B108

of absorption satisfies (1) and (2) only at low temperatures. It is possible to estimate the relaxation time of exciton excitations from the half-width of the curve indicating the departure of (1) and (2) from the true behavior. In the temperature investigated range it is between $0.38 \cdot 10^{-11}$ and $0.16 \cdot 10^{-11}$ sec. The phonon frequency ν_ϕ equals the half-width of the free part of the first step and does not depend on temperature. The spectrum corresponding to exciton-phonon excitation in Cu_2O is continuous in a wide range of wavelengths. A similar exciton mechanism was proposed by V. P. Zhuze and S. M. Ryvkin (DAN SSSR, 77, 2, 241, 1951) for photoconductivity and by Yu. I. Karkhanin and V. Ye. Lashkarev (DAN SSSR, 97, 1007, 1954) for photoluminescence. Ye. K. Frolova is mentioned. There are 4 figures, 1 table, and 15 references: 11 Soviet and 4 non-Soviet. The three references to English-language publications read as follows: J. Elliott. Phys. Rev. 108, 6, 1957; P. W. Baumeister. Phys. Rev. 121, 2, 1960; G. Macfarlane et al. Advances semic. science, 1958.

ASSOCIATION: Kiyevskiy gosudarstvennyy universitet im. T. G. Shevchenko
Card 3/4

Exciton-phonon absorption ...

32070
S/181/61/003/012/004/028
B102/B108

(Kiyev State University imeni T. G. Shevchenko)

SUBMITTED: June 28, 1961

Card 4/4

GORBAN' I.S.

34432
S/185/61/006/006/009/030
D299/D304

24350)

AUTHORS: Horban', I.S., and Rud'ko, S.M.

TITLE: Absorption- and luminescence spectra of HgJ_2 crystals

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 6, no. 6, 1961, 764 - 767

TEXT: Exciton theory in the effective-mass approximation is consi-dered for the case of non-hydrogenic exciton spectra, as well as the following related problems: Transformation of exciton-excita-tion energy into radiation (due to direct transitions from exciton levels), conditions for transitions without radiation, and the in-teraction between exciton excitation and lattice defects. The ab-sorption- and luminescence spectra were measured at temperatures of 20, 77 and $100^\circ K$. The luminescence was studied on single crystals, whereas the absorption spectra were studied on polycrystalline spe-cimens. A figure shows the obtained spectra. The high values of the absorption coefficients (10^4 cm^{-1}) and the obtained reproducibility of data for various specimens, show that the absorption spectrum is

Card 1/3

Absorption- and luminescence ...

S/185/61/006/006/009/030
D299/D304

of crystalline type. The high values of the absorption coefficients show that the corresponding optical transitions are direct allowed transitions. The spectral band of longest wavelength corresponds to transitions to the lowest exciton-state. It is important to calculate the oscillator strength f for this band; it was found that $f = 6 \cdot 10^{-4}$ to $4 \cdot 10^{-4}$ (for temperatures between 20 and $100^\circ K$). Knowing f, it is possible to determine the dissociation energy of excitons $G_{exc.}$; this was found to be $0.14 - 0.17$ ev., very close to the values of the spectral distance ($0.14 - 0.15$ ev) between the maximum of the band and the beginning of the continuous absorption (which increases sharply in the shortwave side of the measured spectrum). The obtained results lead to the conclusion that the continuous absorption is due to interzone transitions. Knowing f, it is also possible to determine the order of magnitude of the diameter of exciton excitation and its reduced effective mass. Another figure shows the energy distribution in the luminescence spectrum, which has 2 bands, corresponding to transitions between exciton states and to luminescence of local centers. The experimentally measured lifetime of excitons and the caluclated one differed by an or-

Card 2/3

Absorption- and luminescence ...   S/185/61/006/006/009/030
                                          D299/D304

der of magnitude. (This discrepancy is explained). By extending the
above considerations to the ratios of luminescence-band intensi-
ties, it is possible to quantitatively determine the efficiency of
radiationless transitions, of exciton radiation, and of exciton
energy transfer to local centers. The obtained experimental results
are proof of the great significance of exciton processes in the
transformation of the excitation energy of HgJ_2 crystals, into lu-
minescence. There are 2 figures and 9 references: 5 Soviet-bloc and
4 non-Soviet-bloc (including 1 translation). The references to the
English-language publications read as follows: R.G. Elliot, Phys.
Rev., 108, 6, 1957; D.L. Dexter, Phys. Rev., 101, 48, 1956; T. Moss
Photocond. in ebm., London, 1952.

ASSOCIATION: Kyyivs'kyy derzhuniversytet im. T.H. Shevchenka (Kyyiv
             State University im. T.H. Shevchenko)

Card 3/3

89235

9.4160 (also 1137,1395)

S/048/61/025/001/001/031
B029/B067

AUTHORS: Gorban', I. S., Rud'ko, S. N., and Shishlovskiy, A. A.

TITLE: Luminescence of semiconducting crystals on excitation in the
                region of the discrete structure of the absorption spectrum

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, v. 25,
                no. 1, 1961, 6-12

TEXT: According to the authors, the intensity of recently observed short-
wave luminescence bands of Cu_2O (Ref. 5) is largely dependent on the
production process and the heat treatment of the specimens. Fig. 1 shows
luminescence spectra of Cu_2O crystals with different resistivities. The
spectra were taken at 20°K and 77°K. The luminescence of Cu_2O crystals is
mainly caused by impurity centers. Radiation 1 is caused by copper vacan-
cies, whereas luminescence 2 and 3 are caused by oxygen vacancies. A
temperature change strongly reduces the luminescence intensity of the
bands in the short-wave region of the spectrum. In Fig. 2, A_1 schematically

Card 1/5

89235

Luminescence of semiconducting crystals S/048/61/025/001/001/031
                                                    B029/B067

illustrates the ground states of defects of the type of copper vacancies.
Levels A_2 and A_3 belong to the centers of the type of oxygen vacancies;
m_1 and m_2 are the excited states of the centers. The mechanism of excita-
tion-energy transfer to impurity centers on illumination of the crystal
with frequencies of its own bands is essential for the explanation of
luminescence and photoconductivity. For this purpose, the authors analyze
some experimental data. Fig. 3 illustrates quantitative measurements of
the absorption spectrum at liquid-air temperature, i.e., of absorption
spectrum (1), excitation spectra of Cu_2O luminescence for radiation 1(2),
as well as for bands 2 and 3(3). This can be explained by two mechanisms:
1) excitation energy is transferred to impurity centers by carriers and
excitons with the same efficiency. 2) Impurity centers are excited by
excitons which are formed directly during light absorption or through
conduction bands by interaction of carriers of opposite sign. According
to the authors, the second mechanism is more probable. In this connection,
reference is made to N. A. Tolstoy's ideas. If $W_{i\phi} < W_i$, the following

Card 2/5

Luminescence of semiconducting crystals S/048/61/025/001/001/031
69235
B029/B067

relation holds for the temperature dependence of the exciton lifetime:

$$\tau = \frac{1}{\beta + W_1 N_1 + (W_2 + W_3)N - (W_1 - W_{1\phi})C_1 e^{-\varepsilon_1/kT} - (W_2 - W_{2\phi})C_2 e^{-\varepsilon_2/kT} - (W_3 - W_{3\phi})C_3 e^{-\varepsilon_3/kT}}$$

For the exciton yield of the i-th band $\eta_i = W_i(N_i - C_i e^{-\varepsilon_i/kT})\tau$ holds with i = 1,2,3; N_i denotes the concentration of lattice defects per unit volume; N_i^- is the number of occupied levels; W_i are the probabilities of collision between excitons and vacancies; $W_{1\phi}$ are the collision probabilities of an exciton with occupied acceptors; β is the decay probability of an exciton without collision with a defect. Furthermore, $N_1^- = C_1 e^{-\varepsilon_1/kT}$, $N_2^- = C_2 e^{-\varepsilon_2/kT}$, $N_3^- = C_3 e^{-\varepsilon_3/kT}$. The conclusions drawn by the authors agree with the experimental results obtained and help to explain some hitherto inexplicable details. The authors then describe luminescence and absorption
Card 3/5

89235

Luminescence of semiconducting crystals ....
(Card 4/5)

S/048/61/025/001/001/031
B029/B067

properties of some other crystals. Fig. 4 shows the energy distribution in the two shortest short-wave luminescence bands of HgI_2. The spectral properties of CdS, ZnS, PbI_2 crystals are similar to those of HgI_2. According to the results obtained, the structure of the excitation spectrum cannot be fully related to the different absorption character. This is the reproduction of a lecture read at the Ninth Conference on Luminescence (Crystal Phosphores), Kiyev, June 20-25, 1960. There are 5 figures, 1 table, and 17 references: 12 Soviet-bloc and 5 non-Soviet-bloc.
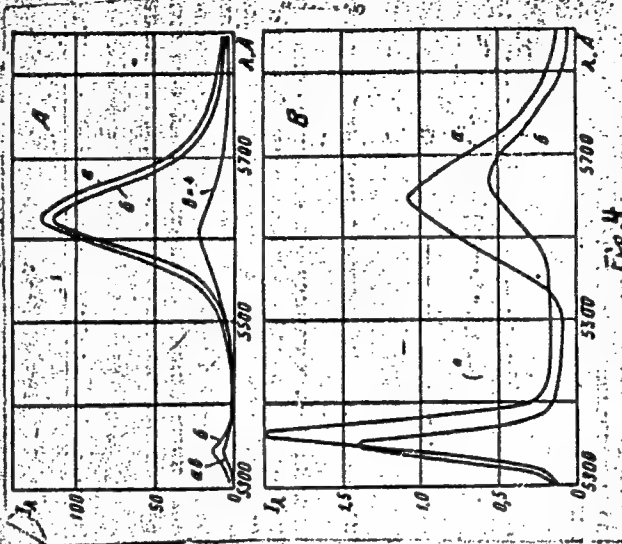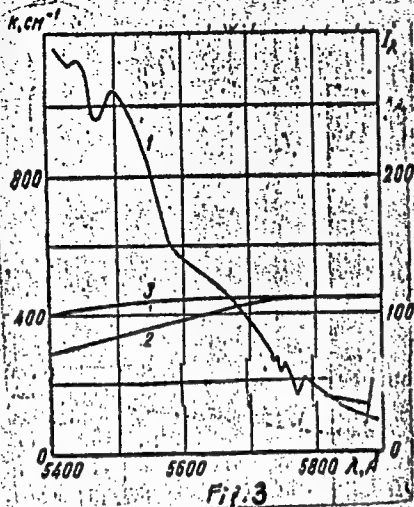
Legend to Fig. 4: Low-temperature spectra of HgI_2; A) $T = 20^{\circ}C$, B) $T = 77^{\circ}C$; curves a and b refer to crystals grown by the sublimation method, θ to crystals rown from a solution.
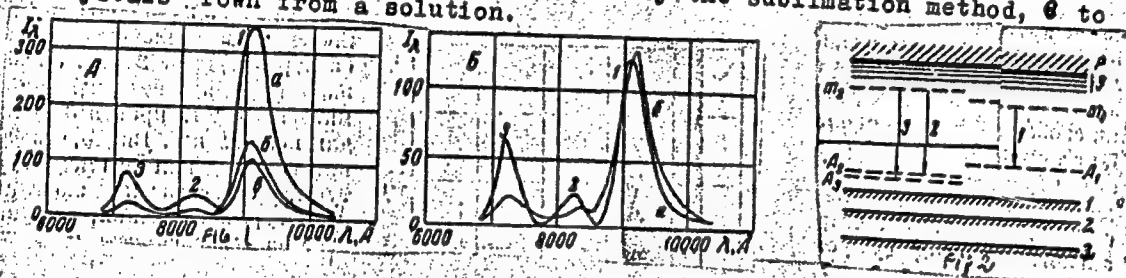
89235

Luminescence of semiconducting crystals ...

S/048/61/025/001/001/031
B029/B067

Fig.3

Fig.4

Card 5/5

GORBAN', I.S.; TIMOFEYEV, V.B.

Complex refraction in copper oxide single crystals. Dokl. AN
SSSR 140 no.4:791-793 O '61.   (MIRA 14:9)

1. Kiyevskiy gosudarstvennyy universitet im. T.G.Shevchenko.
Predstavleno akademikom I.V.Obreimovym.
              (Copper oxide crystals--Optical properties)

AUTHORS: Gorban', I.S., Rud'ko, S.N.

TITLE: Absorption and photoluminescence spectra of HgI_2 crystals

TEXT: The spectra were measured at 20, 77 and about 100°K using a mirror spectrometer with a plane diffraction grating. The linear dispersion was about 16 Å/mm.   A ФЭУ-17 (FEU-17) photomultiplier was used as the detector.   The photoluminescence was measured in single crystals and the absorption spectra were determined for very thin polycrystalline plates.   Fig.1 shows the absorption spectrum (3) and the energy distribution in the photoluminescence spectrum (1,2) of the red modification of HgI_2 at 20°K.   Curve 2' in this figure shows the peak marked 2   on a larger scale.   Fig.2 shows the energy distribution in the photoluminescence spectrum of HgI_2 (I - 20°K,   curves a and б are for single crystals (obtained from the vapour phase) and refer to different portions of the original material;   curve в represents the luminescence of a crystal grown from solution; Card 1/5

S/051/62/012/005/010/021
E032/E414

Absorption and photoluminescence ...

II - photoluminescence spectrum of specimen a).   It is argued
that the discrete structure of the absorption spectrum is
associated with exciton states.   The photoluminescence spectrum
is due to transitions from exciton levels and the emission of
local centres of the lattice-defect type.   Analysis of the
absorption spectra at $20°K$ showed that the exciton diameter and
its effective mass are approximately 1.55×10^{-7} cm and $0.43 \ m_e$
respectively.   The general conclusion is that exciton processes
play a major role in the transformation of the energy of
excitation of HgI_2 crystals into photoluminescence.
There are 2 figures.

SUBMITTED: March 31, 1961

Card 2/2

33434

24.3500 (1137,1138,1144)

S/048/62/026/001/010/018
B117/B102

AUTHORS: Belyy, M. U., Gorban', I. S., and Shishlovskiy, A. A.

TITLE: Photoluminescence of heavy-metal halides and semiconductor
             crystals

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26,
             no. 1, 1962, 103 - 112

TEXT: 1. Photoluminescence of heavy-metal halides. It has been found at
the Kiyevskiy gos. universitet im. T. G. Shevchenko (Kiyev State University
imeni T. G. Shevchenko) that luminescence in alkali halide crystal
luminophores takes place even without any ion association. Unlike Tl, Pb,
and Sn the discovered luminescence of tellurium, antimony, and bismuth
halides is observable at low temperatures only. An optical method
developed by the authors themselves [Abstracter's note: details not given]
was applied to determine the composition of the complexes forming in
thallium and lead halide solutions, and the respective absorption spectra
were calculated. Each type of complex is shown to have its own
absorption spectrum. The shape of the absorption band is equal for each

Card 1/4

Photoluminescence of heavy-metal...

complex, and this points to one and the same absorption center, namely, the heavy-metal cation. With the exception of the thallium ion, heavy-metal cations are not luminescent in the hydrated state. However, if halogen ions are introduced into the aqueous solution, a luminescence characteristic of the metal salt concerned is brought forth. Complexes of differing compositions have the same luminescence spectrum in the heavy metal concerned. Their absorption spectra, however, differ noticeably as to wavelength. Unlike the luminescence spectra they are hardly affected by temperature. On a drop of temperature, the luminescence spectrum first shifts toward the longwave, and then sharply toward the shortwave range. The change of direction coincides with vitrification. The luminescence yield of the solutions examined grows sharply with a drop of temperature, and on the passage from one halogen to another it decreases in the following sequence: Cl^-, Br^-, I^-. In acid media it is noticeably decreased by shortwave-ultraviolet irradiation. It has been found that luminescence is caused by s-electrons. As for thallium and lead halide solutions, also d-electrons are probably involved. A comparison between absorption and luminescence spectra of liquid solutions and between alkali halide crystal phosphors similar in composition revealed great similarity

Card 2/4

33434

S/048/62/026/001/010/018
B117/B102

Photoluminescence of heavy-metal...

between their absorption and luminescence centers. 2. Photoluminescence of semiconductors. The authors' investigation chiefly yielded quantitative data regarding the absolute values of the absorption coefficients and the relative energy distribution in the emission spectra, thus permitting the interpretation of the latter. Cu_2O, PbI_2, SiC, and HgI_2 crystals were examined. It has been found that the character of photoluminescence in semiconductors is determined by the characteristics of optical transitions related to light absorption. The particular character of the structure of natural energy states in crystals manifests itself in that the energy distribution in the photoluminescence spectrum in straight forbidden and oblique transitions is determined by local centers. In the case of a longwave edge structure due to straight allowed transitions, a natural radiation of crystals is observable besides the luminescence of local centers. Intense natural radiation occurs only if exciton transitions are of high probability and the local centers are not too concentrated. A study of optical properties of some semiconductors showed that the exciton structure of the absorption spectrum can be observed under certain conditions, namely, at low

Card 3/4

Photoluminescence of heavy-metal...

33434
S/048/62/026/001/010/018
B117/B102

temperatures and on sufficiently large crystals. Based on the properties of the longwave edge fine structure, a classification and a description of the character of optical transitions are possible. The energy distribution in the emission spectrum and its dependence on the wavelength of excitation are strongly influenced by the character of natural energy states of crystals, and especially by the exciton processes taking place in the latter. There are 7 figures, 3 tables, and 22 references: 16 Soviet and 6 non-Soviet. The four most recent references to English-language publications read as follows: P. W. Baumeister, Phys. Rev., 121, 2, (1961); G. G. Macfarlane a. oth., J. Chem. Phys. Solids, 9, 388 (1959). Phys. Rev., 108, 6 (1957); C. D. Clarc, J. Chem. Phys. Solids, 9, 481 (1959).

ASSOCIATION: Kiyevskiy gos. universitet im. T. G. Shevchenko (Kiyev State University imeni T. G. Shevchenko)

Card 4/4

GORBAN', I.S.

Study of the long-wave self-absorption edge of a antimony-cesium
photocathode. Izv. AN SSSR. Ser.fiz. 26 no.11:1376-1382 N '62.
(MIRA 15:12)

1. Kiyevskiy gosudarstvennyy universitet im. T.G. Shevchenko.
(Cathodes)   (Spectrum analysis) (Photoelectricity)

S/181/63/005/004/001/047
B102/B186

AUTHORS: Gorban', I. S., Timofeyev, V. B., and Frolova, Ye. F.

TITLE: Spectroscopic observation of exciton scattering in a crystal

PERIODICAL: Fizika tverdogo tela, v. 5, no. 4, 1963, 977 - 981

TEXT: The authors investigated the relaxation effects of exciton states in Cu_2O crystals wherein exciton-phonon absorption spectra may be observed (FTT, 3, 12, 1961). These spectra have a steplike structure, caused by the excitation of the n=1 exciton state of the yellow series with optical phonon (105 cm^{-1}) absorption or emission. The exciton-phonon step broadens in consequence of relaxation processes occurring on the establishment of the thermodynamic equilibrium in the exciton band. The broadening is characterized by the deviation ($\Delta\nu$) of the frequency dependence of the absorption coefficient near the step edges from the regular form (Phys. Rev. 108, 1384, 1957), which arises at sufficiently high temperatures. The blurring of the edges, $\Delta\nu \sim 1/\tau$, (τ is the relaxation time) was plotted as a function of temperature between 100 and 400°K; $\Delta\nu$ proved to be almost independent of temperature up to ~ 280°K, after which it rose rapidly. From Card 1/2

this behavior it was concluded that the excitons - as also the carriers -
are mainly scattered from lattice vibrations. The exciton diffusion para-
meters are estimated, whence a close relation was found to exist, between
the properties of the exciton-phonon spectrum and the kinetics of the photo-
luminescence of impurity centers in Cu_2O. The exciton diffusion coefficient
is $D = 0.7$ cm^2/sec ($T = 293^{\circ}K$) and the hole diffusion coefficient is 0.25
cm^2/sec for $\mu = 100$ $cm^2/v \cdot sec$. There are 2 figures.

ASSOCIATION: Kiyevskiy gosudarstvennyy universitet im. T. G. Shevchenko
(Kiyev State University imeni T. G. Shevchenko)

SUBMITTED: September 21, 1962

Card 2/2

L 13038-63   EWT(1)/EWP(q)/EWT(m)/BDS   AFFTC/ASD/ESD-3   JD/WH/
IJP(C)
ACCESSION NR: AP3000615   S/0181/63/005/005/1368/1372   64
                                                                       60

AUTHOR: Gorban', I. S.; Rud'ko, S. N.

TITLE: Optical properties of silicon-carbide crystals

SOURCE: Fizika tverdogo tela, v. 5, no. 5, 1963, 1368-1372

TOPIC TAGS: absorption band, p-n junction, SiC, absorption edge, direct transition, indirect transition, phonon, luminescence, photoluminescence, silicon-carbide crystal, SiC crystal

ABSTRACT: The authors have investigated the structure of a long-wave edge of the proper absorption band through a wide temperature range for artificial and commercial-grade SiC crystals. The structure of the long-wave edge is determined by indirect transitions in which three types of phonons participate (with energies of 0.04, 0.067, and 0.1 ev). The reflection spectrum of SiC was studied in ultraviolet light, and direct transitions were detected. The energy gap between the extremes represented by direct and indirect transitions is about 1 ev. SiC crystals possess two types of luminescence, one originating in the body of the crystal, the other associated with radiative recombination of carriers within p-n junctions, taking place near the surface. The excitation function of photo-

Card 1/2

L 13038-63
ACCESSION NR: AP3000615   4

luminescence indicates that, deep within the absorption band, SiC crystals are
characterized by excitations which are free to transfer energy to impurity centers
of luminescence until thermodynamic equilibrium is reached in the conduction band.
"In conclusion, the authors consider it their pleasant duty to thank S. M. Genkina,
S. A. Dobrolezh, and V. Z. Smushkevich for their kindness in furnishing the silicon-
carbide crystals used in the investigation." Orig. art. has: 5 figures.

ASSOCIATION: Kiyevskiy gosudarstvenny*y universitet im. T. G. Shevchenko
(Kiev State University)

SUBMITTED: 15Sep63   DATE ACQ: 11Jun63   ENCL: 00

SUB CODE: 00   NO REF SOV: 006   OTHER: 008

Card 2/2

S/185/63/008/001/014/024
D234/D308

GORBAN, I.S.

AUTHORS: Horban', I. S., Grytsenko, Yu. I. and Rud'ko, S. M.

TITLE: Optical properties of admixture centers and the pho-
             toconductivity of cuprous oxide

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 8, no. 1, 1963,
             96-100

TEXT: The authors measured absorption spectra of admixtures,
energy distribution in the photoluminescence spectrum and special
dependences of photoconduction kinetics in Cu_2O specimens annealed
under various conditions. Results are given for three typical spe-
cimens annealed in oxygen at 1) 1.0 mm Hg, $1070^\circ C$, 2) 0.002 mm Hg,
$700^\circ C$, 3) 0.0010 mm Hg, $800^\circ C$. Specimen no. 1 exhibits photocon-
ductivity at the long-wave end of the band, no. 3 has maximum
photoconductivity at 7200 Å, and no. 2 has intermediate proper-
ties. The results are discussed in detail. The intensity of ad-
mixture absorption is correlated with that of short-wave photo-
luminescence bands, which are probably associated with oxygen

Card 1/2

Optical properties of ...

S/185/63/008/001/014/024
D234/D308

vacancies. The latter cause an admixture photoconductivity in the long-wave part of the spectrum, characterized by long relaxation times. The interaction of excitons with different admixture centers is found to be selective. There are 3 figures.

ASSOCIATION: Kyyivs'kyy derzhuniversytet im. T. H. Shevchenka
               (Kiev State University im. T. H. Shevchenko)

SUBMITTED: July 2, 1962

Card 2/2

S/0051/64/016/004/0638/0641

ACCESSION NR: AP4032868

AUTHOR: Gorban', I.S.; Timofeyev, V.B.

TITLE: New data on the absorption spectrum of lithium fluoride crystals

SOURCE: Optika i spektroskopiya, v.16, no.4, 1964, 638-641

TOPIC TAGS: lithium compound, luminescence spectrum, absorption spectrum, color center, F center

ABSTRACT: A distinctive characteristic of LiF crystals, as members of the general class of alkali halide crystals, is that, in addition to the systems of broad absorption and photoluminescence bands typical of all alkali halide crystals, LiF crystals also exhibit narrow absorption and luminescence bands, the origin of which is still obscure. Accordingly, in the present work there was investigated the absorption spectrum of x-ray irradiated (colored) lithium fluoride crystals cooled to 20°K. Three structure groups were discerned; the wavenumbers of the head lines are 19 104, 20 516, and 21 063 cm^{-1}. All but the first disappear with warming to 77°K. At 20°K the intensity ratios of the head lines are 1:0.17:0.033, and are independent of the degree of x-irradiation, polarization of the light, etc. Comparison with the

Card 1/2

ACCESSION NR: AP4032868

luminescence spectrum (obtained by other investigators at $77^{\circ}K$) made it possible to identify in the latter a series of lines in mirror symmetry with the absorption series. The results are interpreted on the assumption that the observed lines are associated with electronic-vibrational transitions in complex color centers in LiF. In conclusion, it is noted that in addition to the above mentioned line groups (series) there were observed in the absorption spectra of freshly colored LiF crystals several lines in the 19 000 cm^{-1} region; these lines are weak and disappear after a few hours; they are attributed to evanescent (time-unstable) centers. Orig.art.has: 2 figures and 1 table.

ASSOCIATION: none

SUBMITTED: 09Sep63   DATE ACQ: 07May64   ENCL: 00

SUB CODE: SS, OP   NR REF SOV: 005   OTHER: 003

Card 2/2

L 10156-63   EWT(1)/EWG(k)/BDS/EEC(b)-2--AFFTC/ASD/ESD-3/
SSD--Pz-4--AT
ACCESSION NR: AP3000320   S/0048/63/027/005/0675/0678

AUTHOR: Gorban', I. S.; Kosarev, V. M.

TITLE: Radiative photoluminescence quenching in lead iodide crystals [Report;
Eleventh Conference on Luminescence held at Minsk 10-15 Sept. 1962]

SOURCE: Izvestiya AN SSSR. Seriya fizicheskaya, v. 27, no. 5, 1963, 675-678

TOPIC TAGS: luminescence, radiative luminescence quenching, lead iodide

ABSTRACT: The absorption spectra of lead iodide crystals exhibit structure at
the long wavelength edge, which is associated with exciton states. The structure
differs for different crystals depending on the method of preparation (growth
from melt or sublimation). The same thing is true of the several bands in the
luminescence spectrum. The reflection spectra of different crystals are
consistent with the absorption spectra. Detailed investigation of the
luminescence of PbI sub 2 shows that there exist two types of crystals; one with
a double short wavelength band; the other with a single band. The splitting of
the short wavelength luminescence band and doubling in the absorption spectrum

Card 1/2

L 10156-63
ACCESSION NR: AP3000320

2

are attributed to the existence of two modifications in the same crystal, one occupying the bulk of the crystal, the other concentrated at the surface and near dislocations and other defects. This is evinced by photochemical transformations: under continuing UV irradiation at 77°K the greenish emission changes to orange as a result of quenching of the shortest wavelength luminescence band. The time variation is nonlinear; that is, the effect exhibits saturation. Restoration of the quenched luminescence was also studied. It is characterized by an exponential function with the activation energy for thermal destruction of the photochemical quenching centers in the exponent. The activation energy was evaluated. On the basis of the photoluminescence characteristics lead iodide crystals may be classified as photochemically active or inactive. The active ones are capable of "remembering" light signals. Orig. art. has 3 figures.

ASSOCIATION: Kievskiy ordena Lenina gos. universitet im. T. G. Shevchenko (Kiev State University)

SUBMITTED: 00   DATE ACQ: 12Jun63   ENCL: 00

SUB CODE: PH   NR REF SOV: 004   OTHER: 002

Card 2/2

L 18852-65   EWT(l)/EWT(m)/EWP(t)/EEC(t)/EWP(b) Feb   IJP(c)/AFWL/ASD(a)-5/
S(mp)-2/SSD/APGC(b)/SSD(c)/ESD(gs)/ESD(t)   JD
S/0181/64/006/008/2389/2392

ACCESSION NR: AP4043358

AUTHORS: Gorban', I. S.; Dashkovskaya, R. A.

TITLE: Absorption spectrum and optical transitions in As_2S_3 crystals

SOURCE: Fizika tverdogo tela, v. 6, no. 8, 1964, 2389-2392

TOPIC TAGS: arsenic sulfide, single crystal, level transition, light polarization, phonon, exciton, forbidden band, absorption spectrum

ABSTRACT: A study of the long-wavelength edge of the fundamental absorption band of As_2S_3 single crystals at 90, 293 and 403K showed the existence of four regions for either of the two polarizations of light (E ∥ C, E ⊥ C) incident normally on a mica-type cleavage plane. These regions (numbered in order of decreasing wavelength) exhibited sublinear (1 and 2) and linear (3 and 4) dependences of

Card 1/3

L 18852-65
ACCESSION NR: AP4043358

the absorption coefficient on the frequency of the incident light.
Regions 1 and 3 disappeared on cooling to 90K. It was concluded
that regions 1 and 2 were due to indirect transitions to exciton
states accompanied by phonon absorption and emission respectively,
and regions 3 and 4 were due to indirect band-to-band transitions,
also accompanied by phonon absorption and emission respectively.
The energy of phonons taking part in these indirect transitions was
found to be 0.04 eV, corresponding to a characteristic temperature
of 465K. The exciton dissociation energies were found to be
$\varepsilon_{||} \approx 0.14$ eV and $\varepsilon_{\perp} \approx 0.17$ eV. The forbidden band width decreased
from 2.64 eV (for $E \,||\, C$) and 2.57 eV (for $E \perp C$) at 90K to 2.365 eV
(for $E \,||\, C$) and 2.355 eV (for $E \perp C$). It was established that the
dichroism of the absorption edge was not so much due to the di-
chroism of the forbidden band width as to the dependence of the ab-
sorption coefficient on the polarization of light. Orig. art. has:
1 figure, 2 formulas, and 1 table.

Card 2/3

L 18852-65
ACCESSION NR: AP4043358   2

ASSOCIATION: Kiyevskiy gosudarstvenny*y universitet im. T. G.
Shevchenko (Kiev State University); Kiyevskiy tekhnologicheskiy
institut legkoy promy*shlennosti (Kiev Technological Institute of
Light Industry)

SUBMITTED: 24Feb64   ENCL: 00

SUB CODE: OP, SS   NR REF SOV: 005   OTHER: 005

Card 3/3

L 20240-65   EWP(e)/EWT(m)   AFWL/ASD(a)-5/SSD/BSD/AFETR/AFTC(p)/
RAEM(c)/RAEM(a)/ESD(gs)/ESD(t)   WH   S/0051/64/017/006/0880/0886
ACCESSION NR: AP5000547

AUTHOR: Gorban', I. S.; Kononchuk, C. L.

TITLE: Anomalous light dispersion in the R-lines of a ruby and refractional shifting of the laser spectrum

TOPIC TAGS: laser, ruby, ruby spectrum, R line, anomalous dispersion, refraction index, negative dispersion

ABSTRACT: An investigation is made of the variations of the refraction index in the spectral region of ruby R-lines responsible for stimulated emission. The dispersion of dichroism of ruby lines caused by chromium ions was measured at room temperature and at liquid oxygen temperature using ruby crystals with a 0.3 percent concentration of chromium. The curves obtained were approximated by formulas with a number of parameters related to the unit density of chromium. These formulas can be used to calculate dispersion curves for ruby R-lines for the two main polarizations and for an arbitrary

Card 1/2

L 20240-65
ACCESSION NR: AP5000547

concentration of chromium. The refractional shifting of a ruby laser spectrum is also considered. A rough estimate shows that variation of the refraction index during the nonstationary mode of operation of a ruby laser will limit the degree of monochromaticity of each spoke. Orig. art. has: 6 figures, 2 tables, and 8 formulas.

ASSOCIATION: none

SUBMITTED: 16Dec63   ENCL: 00   SUB CODE: EC, OP

NO REF SOV: 004   OTHER: 004   ATD PRESS: 3163

Card 2/2

... ./...../........./....../.../.../......../.../..../../...../.../.../...../(.)/
....,............. ....1276/1278

......., I. S., Suleymanov, Yu. M.

......tion of glow and adhesion processes in silicon carbide crystals

...... Fizika tverdogo tela, v. 7, no. 4, 1965, 1276-1278

.... silicon carbide, thermoluminescence, electroluminescence, phosphor-
....ration, carrier adhesion

.....iments are described on thermoluminescence and the temperature de-
.... and ....
.... The experiments show that the ... .
....- frequently, especially in cryst...
....
....

.... thermoluminescence maxima, one at .. ..
....ype the low temperature maximum of thermoluminescence had a fine

Card 1/2